TRANSITION OF STAB TECHNOLOGY

ENHANCING WARFIGHTER CAPABILITIES

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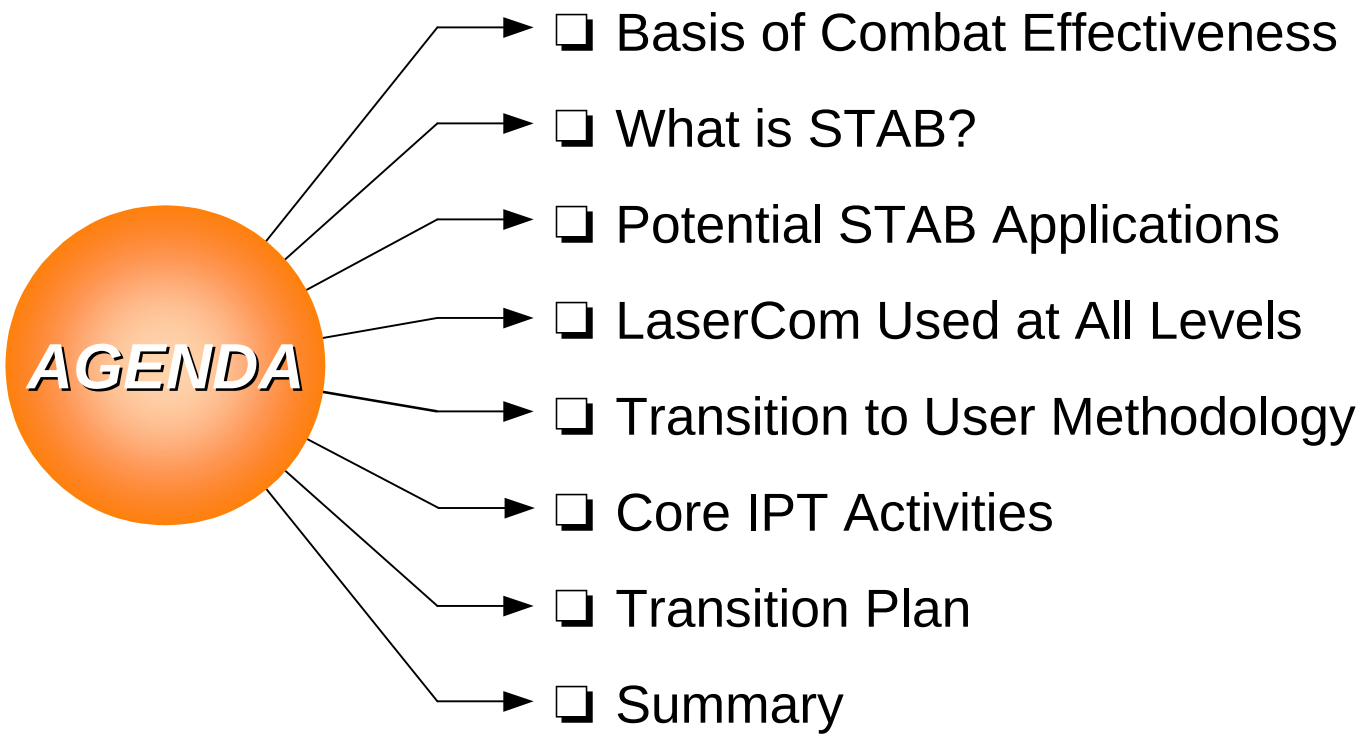
PURPOSE

Identify Planning Process and Key Players in Transitioning STAB Technology



BASIS OF COMBAT EFFECTIVENESS

The Essential Attributes of an Effective Fighting Force

TO WIN A BATTLE -- FORCES MUST BE ABLE TO MOVE, SHOOT, & COMMUNICATE

SHORTFALLS IN TACTICAL COMMUNICATIONS

MSE communications assets are currently being used throughout the military.

- ❑ **RF communications are not always effective.**
- ❑ **Frequency allocation is a serious problem.**
- ❑ **Bandwidth is too narrow for some traffic needs.**
- ❑ **RF omni-directional emissions allow targeting of our systems.**
- ❑ **Can not be used during periods of radio silence.**
- ❑ **RF traffic is easily intercepted by the enemy.**
- ❑ **RF signals are easily jammed.**
- ❑ **Time to set up and relocate RF stations (MSE) takes too long.**
- ❑ **Use of wire is costly, time consuming and**

WHAT IS STAB?

Mechanical Steering → *Evolves* → **Electronic Steering**

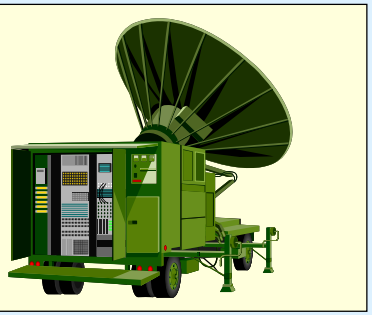
Natural Evolution of Technology

Radar Technology Growth

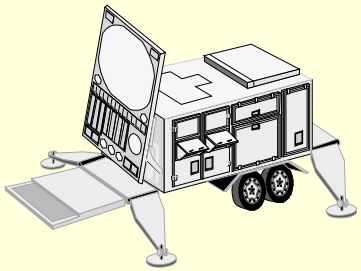
LaserCom Analogue of Radar

LaserCom Technology Growth

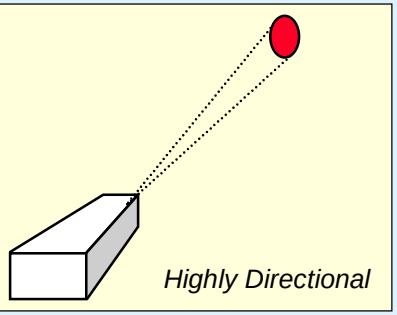
Traditional Dish Radar



Phased Array Radar



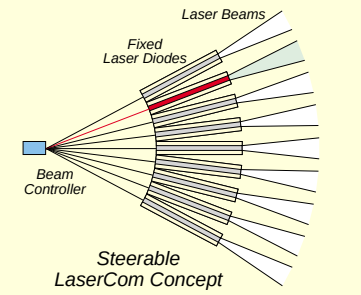
Traditional Laser



DARPA

STAB Program

Steered Laser



Technology exploitation of mechanically, electronically, and optically steered approaches

FIELDING A STEERABLE LASER SYSTEM IS CRITICAL TO MANY APPLICATIONS

TACTICAL BENEFITS OF LASERCOM

- ❑ Supports all tactical operations:
  - ✻ Offense, defense, movement to contact.
  - ✻ Clandestine operations.
  - ✻ Naval / Marine Corps maneuvers.
  - ✻ Satellite link -- enhanced COMSEC.
- ❑ Broad potential bandwidth:
  - ✻ Transmits voice, data, & images.
  - ✻ Huge throughput
- ❑ Narrow beamwidth:
  - ✻ Highly directional - secure.
  - ✻ Tactically useful range.
- ❑ Eliminates many miles of messy wires.
- ❑ Provides basis for tactical internet system.
- ❑ Extends frequency allocation -- less conflict.
- ❑ Less vulnerable to enemy jamming.
- ❑ Provides secure comms during radio silence.
- ❑ Eliminates RF signature (laser less targetable).

Transmits at 1.2 Gbps?

- 800 lb. of paper w/text/sec
- 80,000 pages/sec
- 2 encyclopedias/sec
- 100 TV channels
- 2,000 lb. of satellite radio transmitters - 2,000 watts

One 29 lb. LaserCom transceiver using 75 watts has this capability

Communications on demand

Covert Operations

LASERCOM HAS APPLICATIONS AT ALL LEVELS

Future Battlefield Requirements Call for Higher and Higher Bandwidths to Handle the Flow of Data

Space

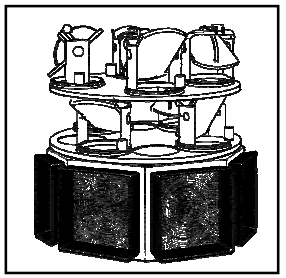
Air

Ground

Satellite Resources
- Communications
- Data Relay
- Image Capture
- GPS

LaserCom Satellite Links

Airborne Sensors / Comms
- Radar
- Optical / Laser
- IR / MMW
- Acoustic
- LaserCom



Artist Concept for LaserCom Hub (STAB)

Robotic Airship

LaserCom Links

Radar

LaserCom Internet

Enemy Position

Scout Vehicle

Tactical LaserCom Binoculars

LASERCOM HAS POTENTIAL TO SUPPORT A BATTLEFIELD INTERNET CONCEPT

MODES AND MISSIONS OF STAB SYSTEMS

LASERCOM

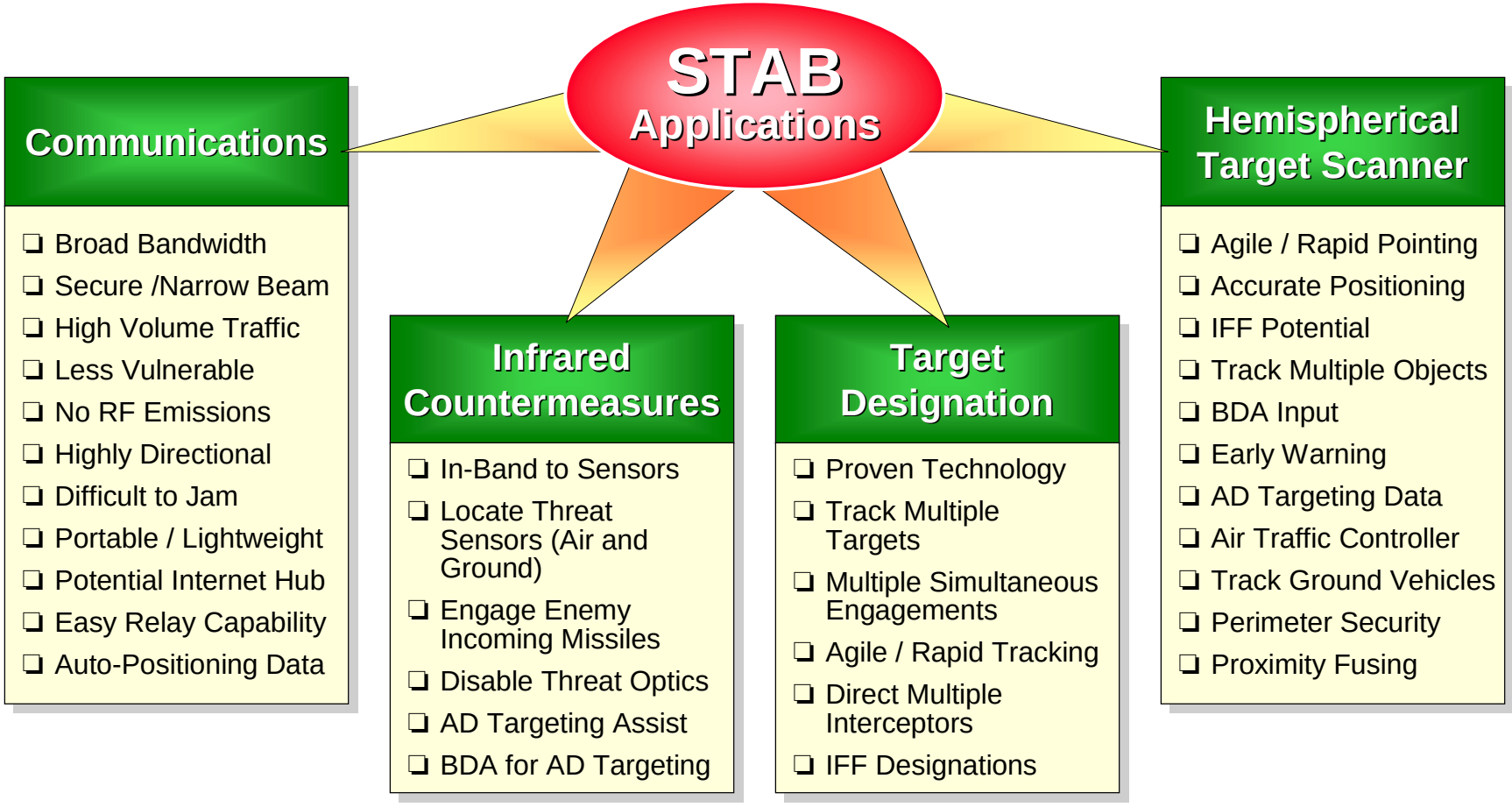




- Modes of operation:
  - Carrier platforms are mobile and transmit:
    - Ground-to-ground (mounted & dismounted).
    - Ground-to-air / air-to-ground.
    - Air-to-air.
    - Space-to-air / ground-to-space.
  - Active: Transmits to other LaserCom devices.
  - Passive: Return data on the carrier wave of an active device (space and dismounted use primarily in an internet mode).
- Platforms for LaserCom:
  - Satellites (high performance / airships / UAVs)
  - Ships
  - Ground vehicles:
    - Armored (tanks / APCs).
    - HMMWV.
  - Stationary comm site (part of MSE system).
  - Dismounted troops / scouts.

PRIMARY STAB APPLICATIONS

How Can STAB Technology Support the Warfighter?



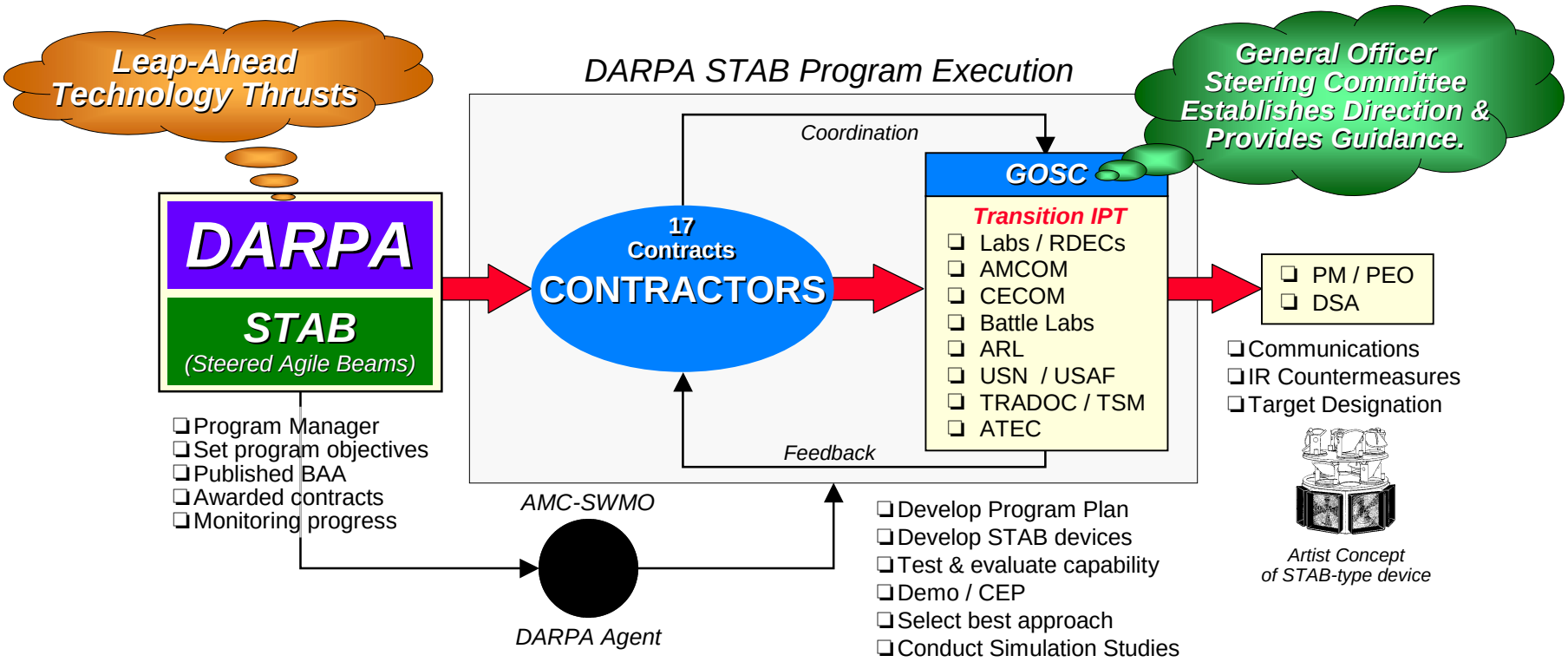
STAB HAS POTENTIAL TO ADDRESS MANY CURRENT BATTLEFIELD DEFICIENCIES

TECHNICAL APPROACH TO PROGRAM IMPLEMENTATION

- **Multi-service involvement is essential.**
  - All services will benefit (Army, Navy, Air Force, Marines).
  - Requires broad base of funding for joint interoperability.
- **Overall direction will be provided by a General Officer Steering Committee (GOSC):**
  - Establishes program direction.
  - Provides guidance for service implementations.
  - Assesses funding requirements and sources.
- **Magnitude of program calls for Integrated Product Team (IPT) approach.**
  - Multiple applications of STAB technology.
  - Crosses many service / organization boundaries.

TRANSITION METHODOLOGY

DARPA's STAB Program Development and Transition Involves Many Service Agencies



Funding Profile = Initial Funding ($36M) + Industry IR&D Funding + Other Agency Contributions = Successful Program

Stone Soup

STAB TECHNOLOGY PROVIDES A LEAP-AHEAD IN WARFIGHTER CAPABILITY

CORE IPT ACTIVITIES

- The Communications IPT monitors and supports the work of all contractors developing STAB technologies.
- The IPT has representation from key government agencies.
- AMC-SWMO (Brian Matkin) is the DARPA agent for the transition of STAB communications technology to the services.
- AFWAL (Cpt Bradley Rennich) is the DARPA agent for transitioning STAB technology into IRCM and multiple target designation.

IPT MEMBERSHIP

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STAB TRANSITION PLAN

- **The key to fielding a STAB system is to clearly defining a user and having a plan to transition the technology.**
- **A preliminary draft of the STAB transition plan has been developed.**
- **The plan applies to all DARPA STAB technology applications:**
  - Communications.
  - Target Designation.
  - Optical Countermeasures.
- **Core IPT is responsible for content and revisions of plan.**
- **The STAB Transition Plan is a living document that will grow**

STAB TRANSITION PLAN

THE STAB TRANSITION PLAN WILL BE UPDATED PERIODICALLY

OTHER STAB APPLICATIONS

- ❑ **STAB technology has many military & commercial applications.**
- ❑ **Any task requiring precision location and tracking of distant objects or transmitting vast amounts of data is a potential STAB application.**

CONSIDER JUST TWO POTENTIAL NASA STAB APPLICATIONS

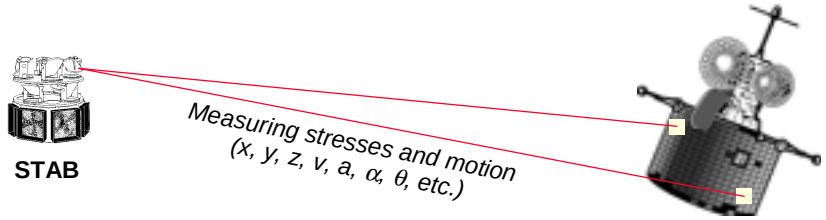
Hit Avoidance in Space

- ✻ Systems in space are confronted with a vast array of debris (manmade & natural).
- ✻ Precise debris orbit data is essential.

- ✻ STAB can detect, acquire and track multiple debris objects simultaneously providing precise orbits data
- ✻ Pulse jets on a space system can be activated to avoid a collision.
- ✻ The precision of STAB sensing can also be used during docking operations.

Remote Stress / Motion Measurements

- ✻ Space systems undergo unique stresses due to motion, location in orbit, and severe temperature changes.
- ✻ STAB can be used to measure relative motion of space systems, and detect stresses related to torsion, bending, and elongation.
- ✻ Precision data from a space-borne STAB device can easily download stress and motion data for analysis by a ground or space based team.

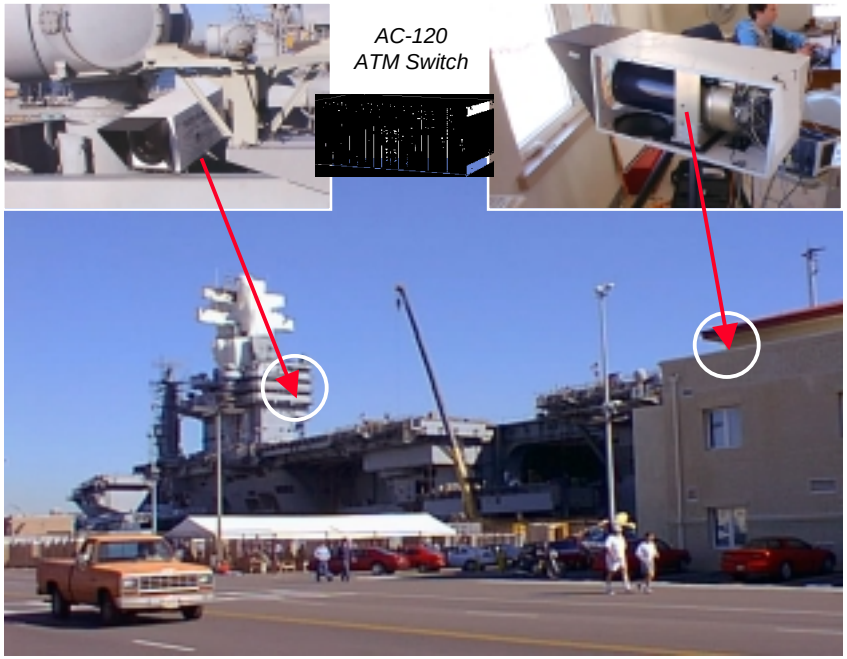


OTHER STAB APPLICATIONS

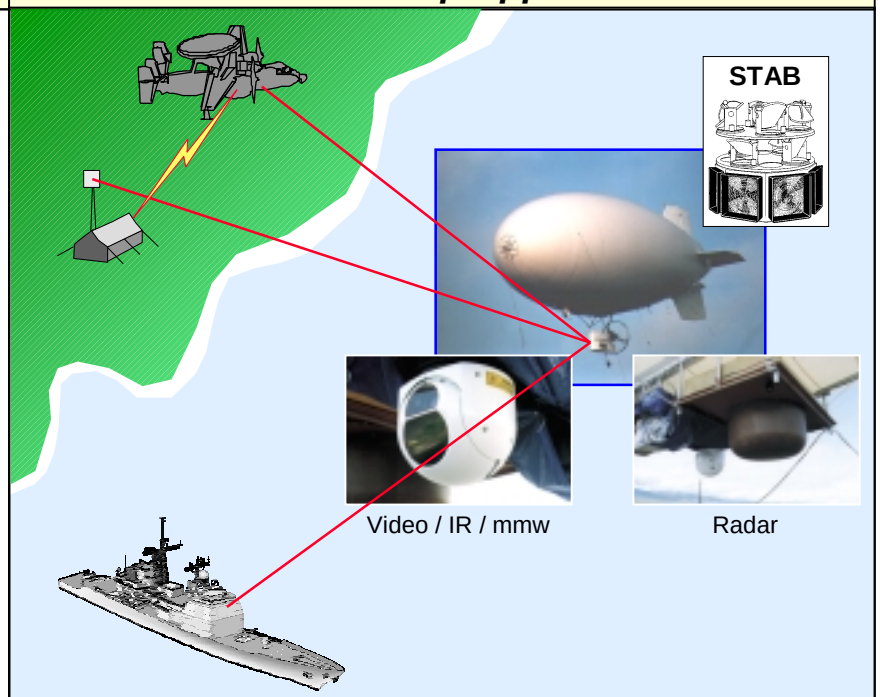
THE NAVY HAS CONSIDERABLE INTEREST IN LASERCOM

Ship-to-Pier Communications

- Ship-to-Pier communications are an essential element of Navy standard operating procedures.
- STAB could easily replace current larger laser systems and provide a broader capability to transmit data to fixed and moving ground-based or sea- and air-borne elements.



Robotic Airship Applications



- Untethered robotic airships offer the Navy an enhanced range capability to communicate and accurately locate friendly or enemy elements.
- Integrating STAB into the airships would provide for a tactical internet capability to transmit and receive large amounts of data on call as needed.

STAB TECHNOLOGY HAS MANY APPLICATIONS THAT ENHANCE CAPABILITIES

SUMMARY

- **Laser Communications is an established technology:**
  - Off-the-shelf / mature for routine applications.
  - Widely associated with fiber optic systems.
- **Military LaserCom has some hurdles to clear:**
  - Eye safe operation with appropriate power / bandwidth.
  - Acquisition & tracking of T/R units (3D environment):
    - Automatic / autonomous capability desired.
    - Analogous to phased array radar technology concept.
  - Adequate range for mounted / dismounted operations.
  - Integration with Army-wide SINCGARS / MSE system.
- **Applications for LaserCom are compelling:**
  - Stealth capability during radio silence.
  - Enhanced frequency allocations reduce conflicts.
  - Tactical LaserCom internet offers significant opportunities.

STAB Program

MULTI-SERVICE TACTICAL APPLICATIONS

STAB -- A DARPA TECHNOLOGY INITIATIVE

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